STAT

LINEAR PHASOLVER MEASURING ENGINE

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A new master driver pattern was completed Thursday, July 30,
STAT by [redacted] received it today and is
examining it for blemishes. The previous master driver pattern
STAT received by [redacted] from [redacted] on Friday, July 17, was
rejected for blemishes. There is high hope that the new one
will be acceptable.

The application of a submicron measuring technique to a measuring machine covering one meter (39+ inches) by 1/4 meter (10 inches) requires careful consideration of the characteristics to be specified for the machine. [redacted] STAT has indicated that he needs a stereo capability in order to get the best possible pointing accuracy. It is apparently a well known and established fact in the cartographic industry that stereo viewing improves pointing accuracy.

The question is: What requirements do stereo viewing impose on the machine specifications? First, obviously, as John R. immediately advised, each of the two platens must be capable of measuring. Thus, four measuring engines are required--one for the x and one for the y axis on each platen. Second, only one platen will be used for a given measurement, the other platen will be slaved to it to provide stereo. It is anticipated at this time that the measuring platen will be commanded by the operator and the slaved platen will be commanded by the computer to maintain stereo. Now arises the question as to what servo accuracy is required on the slaved platen to maintain stereo.

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STAT [redacted] to try to get a feel for the problem. [redacted] is a STAT small aerial survey company that contracts to make contour maps from aerial photography. They have two Kelch second order plotters.

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Their photogrammatrist, [redacted] was very helpful. It appears that very wide latitude in positioning can be tolerated while still maintaining stereo registration. For a 10-inch viewing distance without magnification, the tolerable misalignment error was on the order of x = 3-1/2 inches, y = 1/4 inch, and θ = 1/10 radian, taken separately.

For operator comfort over extended work periods the allowable error should be considerably less, perhaps 1/10 those figures. Also, the above figures must be divided by the viewing magnification to obtain the allowable slaved platen servo error. It appears from the foregoing that the allowable positioning error for the slaved platen to maintain stereo registration is readily achievable.

There is another more difficult question however which, to my mind, is not yet fully answered. If each eye is observing the separate photos of a stereo pair and the images and the reticle are being fused by the operator, which eye (and, therefore, which photo) is being used for pointing and measuring?

The two photos will undoubtedly not be coincident to the measuring accuracy; therefore, which measuring engine should be used? One way to circumvent the question is to use a reticle in only one eyepiece and measure with the corresponding measuring engine. This may, however, reduce the sensitivity of the stereo process.

When the reticle is not seen in stereo, the Z relation of the reticle to the ground plane is ambiguous. If the reticle is observed in stereo, it can be laid right on the ground plane or above it or below it with great sensitivity by adjusting the x-registration of the stereo pair. Perhaps Dick S. could run some tests on the Nistri to try to put numbers on this sensitivity. We were unable to get quantitative data on the Kelch. It may be that the Z sensitivity of a pair of reticles observed in stereo will be the real servo accuracy criterion for the slaved platen.

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